



424134



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USEPA Region 5
77 West Jackson Boulevard (SR-6J)
Chicago, IL 60604-3507

Mr. Michael Ribordy
USEPA Region 5
77 West Jackson Boulevard (SE-5J)
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Subject:

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Time-Critical Removal Action – Former Plainwell Impoundment
Groundwater Monitoring Well Installation Plan

Dear Jim and Mike:

In accordance with the approved Time-Critical Removal Action Design Report (Design Report) (2007) and the Area 1 Supplemental Remediation and Feasibility Study (SRI/FS) Work Plan (2007), ARCADIS is proposing to install fifteen groundwater monitoring wells at the former Plainwell Impoundment in Allegan County, Michigan. This letter provides details regarding the proposed well installation program to facilitate coordination with agency oversight personnel. Attached please find information regarding the proposed well installation activity, including a well location map, groundwater and surface water elevation data, and logs of pilot borings drilled at the fifteen locations in which the wells are to be installed. Also shown on the logs are preliminary construction specifications for each monitoring well.

The proposed well construction specifications were prepared based on the objectives of the monitoring program stated in the Design Report to evaluate the potential presence of PCBs in groundwater and assess the migration of PCBs (if any) to the river, as well as the observed geology and water elevations. The recent water elevation data and field observations suggest that surface water and groundwater elevations are at present relatively high due to snow-melt flows and the remaining transient effect of the mid-channel prism. As discussed in the Design Report, groundwater and surface water levels near the former dam are also expected to be up to a foot higher on average than they ultimately will be once the mid-channel

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SEDIMENTS

Date:
February 25, 2009

Contact:
Steve Garbaciak

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Our ref:
B0064530.0000.00675

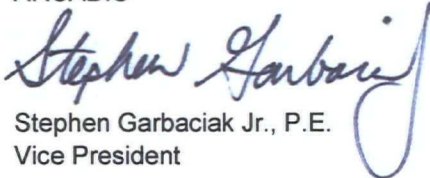
prism is fully eroded away, which is anticipated to occur from one to five years after the dam removal activities are completed. These factors will be considered in establishing final well screen elevations upon installation in the field. Those determinations will be guided by the well construction plan shown on the boring logs, but also observed field conditions at the time of installation.

Staff gages will be installed in conjunction with the groundwater well installation at the SG-1, SG-3, and SG-4 locations shown on the well location map. All top of well elevations and the staff gages will be surveyed into the National Geodetic Vertical Datum 29 and the North American Datum of 1983 horizontal datum at a precision of 0.2 ft.

It is our intent to mobilize to the site and begin the drilling and well installation program on March 2. We anticipate well development will occur during the week of March 22, followed by collection of the first groundwater samples during the week of March 30. If you have any questions or wish to discuss the well installation program further, please contact Doug Cowin of ARCADIS (312.332.4937x11), who will be coordinating this activity, or me, at your convenience.

Sincerely,

ARCADIS


Stephen Garbaciak Jr., P.E.
Vice President

Copies:

Samuel Borries, USEPA
Paul Bucholtz, MDEQ
Jeff Keiser, CH2M Hill
J. Michael Davis, Esq., Georgia-Pacific LLC
Gary Griffith, Georgia-Pacific LLC
L. Chase Fortenberry, P.E., Georgia-Pacific LLC
Michael Erickson, P.E., ARCADIS

DKC/dkc

Table 1.
Groundwater and Surface Water Elevation Data
Time Critical Removal Action
Former Plainwell Impoundment
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Date	PZ-1	PZ-1 Groundwater Elevation	SG-1	SG-2	PZ-5	PZ-5 Groundwater Elevation	SG-5	Comments
11/21/08	9.60	701.70	702.25	702.16	10.38	703.52	703.42	SG-1 is currently behind an enclosed sheetpile wall
11/22/08	9.52	701.78	702.25	702.10	10.36	703.54	703.35	SG-1 is currently behind an enclosed sheetpile wall
11/24/08	9.69	701.61	702.25	702.06	10.55	703.35	703.30	SG-1 is currently behind an enclosed sheetpile wall
11/26/08	9.75	701.55	701.75	701.95	10.70	703.20	703.12	SG-1 is currently behind an enclosed sheetpile wall
12/01/08	9.85	701.45	701.55	701.46	10.84	703.06	703.11	SG-1 is currently behind an enclosed sheetpile wall
12/02/08	9.85	701.45	701.55	701.45	10.85	703.05	703.10	SG-1 is currently behind an enclosed sheetpile wall
12/15/08	9.29	702.01	NA	702.70	10.26	703.64	703.76	SG-1 was destroyed; no further readings
12/16/08	9.26	702.04	NA	702.68	10.25	703.65	703.73	SG-1 was destroyed; no further readings
12/17/08	9.29	702.01	NA	702.80	10.10	703.80	703.90	SG-1 was destroyed; no further readings
12/20/08	9.20	702.10	NA	NA	10.45	703.45	NA	SG-2 and SG-5 are frozen and unreadable
12/23/08	9.55	701.75	NA	NA	10.59	703.31	NA	SG-2 and SG-5 are frozen and unreadable
12/29/08	8.01	703.29	NA	NA	8.93	704.97	NA	SG-2 and SG-5 are underwater
12/30/08	8.06	703.24	NA	NA	8.97	704.93	NA	SG-2 and SG-5 are underwater
12/31/08	7.81	703.49	NA	NA	8.50	705.40	NA	SG-2 and SG-5 are underwater
01/02/09	7.66	703.64	NA	NA	8.42	705.48	NA	SG-2 and SG-5 are underwater
02/17/09	8.59	702.71	NA	NA	9.88	704.02	703.75	SG-2 was displaced by ice; no further readings
02/20/09	8.96	702.34	NA	NA	10.25	703.65	703.43	SG-2 was displaced by ice; no further readings

Notes:

PZ = piezometer

SG = staff gage

NA = not available (no data collected, see comments for explanations)

Piezometer readings are taken from the top of PVC

SG-4 was not used for comparison of water elevations at PZ-1 because it was enclosed by a coffer dam during the time of monitoring.

Date Start/Finish: 11/13/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, John Olson
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 2" x 2' Split Spoon

Northing: 350957.1
Easting: 12772453.2
Casing Elevation: NA

Borehole Depth: 24' bgs
Surface Elevation: 708.0 ft AMSL

Descriptions By: Ron Kuhn

Well/Boring ID: MW-01 Proposed
Client: Kalamazoo River Study Group

Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
710										
		1	0-2	1.2	4 4 3 2	7	NA		Gray-brown Silty fine SAND, trace medium to coarse Sand, trace fine Gravel (road base). Orange-brown Silty fine SAND, trace medium to coarse Sand, trace fine to medium Gravel, dry. Gray-brown Silty CLAY, trace Organics, damp.	Locking J-Plug Steel Protective Casing Proposed bentonite grout 0 to 4.5' bgs Proposed double casing 0 to 6' bgs Proposed 2" ID Type 304 Stainless Steel riser 2' ags to 7' bgs Proposed bentonite seal 4.5 to 6.5' bgs
705		2	2-4	1.0	2 2 2 3	4	NA		No recovery using either 2" and 3" split spoon.	
5		3	4-6	0.0	2 2 2 2	4	NA			
		4	6-8	1.2	WOH 2 3 5	5	NA		Dark brown organic Clayey SILT, little fine Sand, moist.	
700									Gray-brown fine SAND, trace Silt, loose, saturated.	
		5	8-10	0.8	3 5 8 10	13	NA		Olive-brown fine to medium GRAVEL, little fine Sand, trace medium to coarse Sand, trace Silt, saturated.	
10		6	10-12	0.4	5 8 12 9	20	NA		Gray-brown fine to medium GRAVEL, trace fine to coarse Sand, saturated.	
		7	12-14	0.7	10 8 5 5	13	NA		Dark gray fine to coarse SAND and fine to medium GRAVEL, saturated.	Proposed grade #5 "Global Filter Pack" silica sand pack 6.5 to 17' bgs Proposed 2" ID Type 304 Stainless Steel 0.010" slotted screen 7 to 17' bgs
695										
15		8	14-16	0.3	5 5 8 8	13	NA			

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; WOH = Weight of Hammer.

 Proposed well construction is shown for review.







Client: Kalamazoo River Study Group

Well/Boring ID: MW-01 Proposed

Site Location:
Plainwell, Michigan

Borehole Depth: 24' bgs


DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
690		9	16-18	0.3	2 5 2 5	7	NA		Dark gray fine to medium GRAVEL, trace fine to coarse Sand, saturated.	
20		10	18-20	0.6	2 3 5 5	8	NA			
		11	20-22	0.0	5 7 8 11	15	NA		No recovery.	
685		12	22-24	0.5	7 7 7 7	14	NA		Gray-brown fine to medium GRAVEL, little fine to coarse Sand, trace Silt, loose, saturated.	
25										
680										
30										
675										
35										



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; WOH = Weight of Hammer.

Proposed well construction is shown for review.

Well/Boring ID: MW-02 Proposed
Client: Kalamazoo River Study Group
Location: Plainwell, Michigan

	<p>Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.</p> <p>Proposed well construction is shown for review.</p>
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Date Start/Finish: 11/14/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, John Olson
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 3" x 2' Split Spoon

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 23' bgs
Surface Elevation: NA

Descriptions By: Ron Kuhn

Well/Boring ID: MW-03 Proposed
Client: Kalamazoo River Study Group

Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		NA	0-3	NA	NA	NA	NA		No Sampling - continuous auger to 3' bgs through 22A stone.	
					2				Dark brown TOP SOIL.	
		1	3-5	0.9	2	4	NA		Gray-brown Silty CLAY, trace Organics, moist.	
					2					
5	-5				2				Dark brown fine SAND, trace Silt, saturated.	
		2	5-7	1.6	2	4	NA		Orange-brown fine SAND, trace Silt, saturated.	
					2					
					2					
		3	7-9	1.3	4	11	NA		Orange-brown fine SAND, little Silt, trace medium to coarse Sand, trace fine to medium Gravel, saturated.	
					7					
					9					
					4				Orange-brown Silty fine SAND, little medium to coarse Sand, trace fine to coarse Gravel, saturated.	
					7					
10	-10	4	9-11	0.6	11	18	NA		Orange-brown fine SAND, little medium to coarse Sand, trace fine to medium Gravel, trace Silt, saturated.	
					12					
					6				Gray-brown fine to coarse SAND, trace fine to medium Gravel, loose, saturated.	
		5	11-13	1.2	6	12	NA			
					6					
					8					
					4					
		6	13-15	1.1	5	10	NA			
					5					
15	-15				7					
		7	15-17	1.0	6	21	NA		Gray-brown fine to medium SAND, little coarse Sand, trace fine to coarse Gravel, saturated.	
					9					

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.
 Used 3" split spoon for all intervals.

Proposed well construction is shown for review.



Client: Kalamazoo River Study Group

Well/Boring ID: MW-03 Proposed

Site Location:

Plainwell, Michigan

Borehole Depth: 23' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		7	15-17	1.0	12 20	21	NA		Gray-brown fine to medium SAND, little coarse Sand, trace fine to coarse Gravel, saturated.	
		8	17-19	1.3	4 5 8 8	13	NA		Gray-brown fine to coarse SAND, little fine to medium Gravel, loose, saturated.	
-20	-20	9	19-21	1.2	6 9 11 13	20	NA		Light gray-brown fine SAND, trace Silt, saturated.	
		10	21-23	1.3	10 11 14 20	25	NA		Gray-brown fine to medium SAND, little coarse Sand, saturated.	
									Gray-brown coarse SAND and fine to coarse GRAVEL, little fine to medium Sand, saturated.	
-25	-25									
-30	-30									
-35	-35									



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.
Used 3" split spoon for all intervals.

Proposed well construction is shown for review.

Date Start/Finish: 11/13/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, John Olson
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 2" x 2' Split Spoon

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 22' bgs
Surface Elevation: NA

Descriptions By: Ron Kuhn

Well/Boring ID: MW-04 Proposed
Client: Kalamazoo River Study Group

Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0	1	0-2	NA	NA	NA	NA		No sampling - continuous Hollow Stem Auger through 22A stone pad.	
		2	2-4	NA	NA	NA	NA			
-5	-5	3	4-6	NA	NA	NA	NA			
		4	6-8	1.5	WOH 1 1	1	NA		Dark gray grading to dark gray-brown fine SAND, trace Silt, loose, wet.	
		5	8-10	0.6	2 2 3 3	5	NA		Light gray-brown fine to medium SAND, little coarse Sand, little fine to medium Gravel, trace Silt, little calcareous Silt/Sand-sized grains, saturated.	
-10	-10	6	10-12	0.5	1 1 1 13	2	NA		Light gray calcareous fine to medium SAND, little fine to medium Gravel, trace coarse Sand, trace Silt (calcareous), saturated.	
		7	12-14	0.9	4 4 4 6	8	NA		Brown fine to medium GRAVEL, trace fine to coarse Sand, trace Silt, saturated.	
									Orange-brown Silty CLAY, moderately stiff, moist.	
-15	-15	8	14-16	0.7	4 4 10 6	14	NA		Orange-brown fine to coarse SAND and fine to medium GRAVEL, trace Silt, saturated.	



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; WOH = Weight of Hammer.

 Proposed well construction is shown for review.





Client: Kalamazoo River Study Group

Well/Boring ID: MW-04 Proposed

Site Location:

Plainwell, Michigan

Borehole Depth: 22' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		9	16-18	0.6	6 6 8 11	14	NA		Orange-brown fine to coarse SAND and fine to medium GRAVEL, trace Silt, saturated. Dark gray fine SAND, trace Silt, saturated.	
		10	18-20	0.5	15 9 7 12	16	NA		Orange-brown fine to coarse SAND and fine to medium GRAVEL, trace Silt, saturated.	
-20	-20	11	20-22	0.3	5 5 8 12	13	NA			
-25	-25									
-30	-30									
-35	-35									



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level; WOH = Weight of Hammer.

Proposed well construction is shown for review.

Date Start/Finish: 11/14/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, John Olson
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 3" x 2' Split Spoon

Northing: 350153.0
Easting: 12773460.8
Casing Elevation: NA

Borehole Depth: 22' bgs
Surface Elevation: 710.9 ft AMSL

Descriptions By: Ron Kuhn

Well/Boring ID: MW-05 Proposed
Client: Kalamazoo River Study Group

Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
9	710	NA	0-4	NA	NA	NA	NA		No sample - continuous auger through 22A stone pad.	
5	705	1	4-6	1.0	3 1 1 1	2	NA		Gray-brown Silty CLAY, trace highly degraded Organics, damp. Gray-brown fine to medium SAND, trace Silt, trace Shells, moist. Dark gray Silty CLAY, moist. Dark gray fine SAND, trace Silt, saturated.	
		2	6-8	1.1	3 1 1 1	2	NA		Olive-brown grading to light gray (calcareous) fine SAND, trace Silt, trace Shells, saturated.	
10		3	8-10	0.4	7 9 10 10	19	NA		Light gray (calcareous) fine to medium SAND, little coarse Sand, trace fine to medium Gravel, trace Silt, saturated.	
	700	4	10-12	1.1	4 6 9 13	15	NA		As above, includes trace coarse Gravel.	
		5	12-14	1.4	23 15 10 8	25	NA		Gray-brown fine to medium SAND, trace coarse Sand, trace Silt, saturated. Gray-brown fine to coarse SAND and fine to medium GRAVEL, trace Silt, saturated. Dark gray fine to medium GRAVEL, little fine to coarse Sand, saturated.	
15	695	6	14-16	0.4	7 10 10 10	20	NA		Dark gray coarse SAND and fine GRAVEL, little fine to medium Sand, saturated.	



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.
 Tried 2" split spoon for 6-8' and 8-10' bgs intervals, no recovery using 2" spoon, so used 3" split spoon for remaining intervals.

Proposed well construction is shown for review.




Client: Kalamazoo River Study Group

Well/Boring ID: MW-05 Proposed

Site Location:

Plainwell, Michigan

Borehole Depth: 22' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		7	16-18	0.8	5 7 8 8	15	NA		Dark gray fine to coarse SAND, little fine to medium Gravel, saturated.	
		8	18-20	0.6	6 7 6 6	13	NA		Dark gray coarse SAND and fine GRAVEL, little fine to medium Sand, trace medium Gravel, saturated.	
20	690	9	20-22	0.0	6 9 9 9	18	NA		No recovery - likely same as above.	
25	685									
30	680									
35	675									



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.
Tried 2" split spoon for 6-8' and 8-10' bgs intervals, no recovery using 2" spoon, so used 3" split spoon for remaining intervals.

Proposed well construction is shown for review.

Well/Boring ID: MW-06 Proposed
Client: Kalamazoo River Study Group
Location: Plainwell, Michigan



ARCADIS
infrastructure, environment, facilities

Proposed well construction is shown for review.

Date Start/Finish: 11/12/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, John Olson
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 2" x 2' Split Spoon

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 16' bgs
Surface Elevation: NA

Descriptions By: Ron Kuhn

Well/Boring ID: MW-07 Proposed
Client: Kalamazoo River Study Group

Location: Plainwell, Michigan

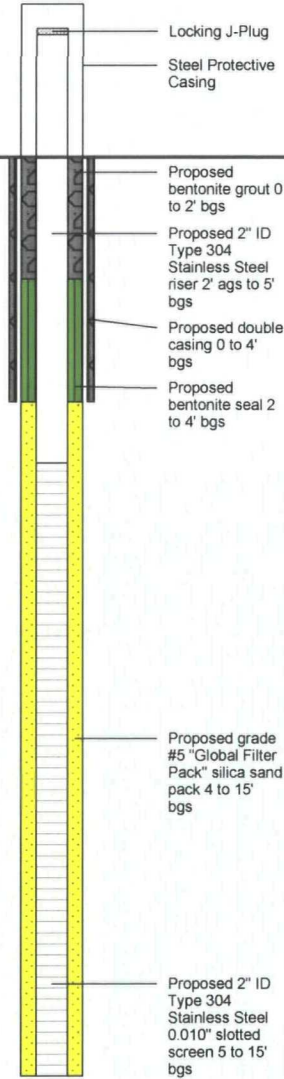
DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		1	0-2	1.8	3 1 3 3	4	NA		Gray-brown Silty CLAY, trace Organics (vegetation), damp.	
		2	2-4	1.5	2 2 2 2	4	NA		Dark brown fine SAND, trace Silt, loose, damp. Orange-brown fine SAND, trace Silt, loose, damp.	
-5	-5	3	4-6	0.6	2 2 2 2	4	NA		As above, trace fine to medium Gravel, wet.	
		4	6-8	0.4	1 2 1 1	3	NA		Orange-brown Silty fine to medium SAND, little coarse Sand, trace fine to coarse Gravel, loose, saturated.	
		5	8-10	0.7	1 2 1 1	3	NA		As above, grading to orange-brown fine to coarse SAND, trace fine Gravel, trace Silt, loose, saturated.	
-10	-10	6	10-12	1.1	2 2 3 3	5	NA		Orange-brown fine to coarse SAND, trace to little fine to medium Gravel, trace Silt, loose, saturated.	
		7	12-14	0.7	2 2 3 4	5	NA		Gray-brown fine to coarse SAND, trace fine Gravel, trace Silt, loose, saturated.	
-15	-15	8	14-16	1.2	3 4 2 5	6	NA		Gray-brown fine to coarse SAND, trace to little fine to medium Gravel, trace Silt, loose, saturated. Dark gray fine to medium GRAVEL, little fine to coarse Sand, trace Silt, loose, saturated.	



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.
 Used 3" split spoon for 6-8' bgs interval, no recovery using 2" spoon.

 Proposed well construction is shown for review.

Date Start/Finish: 11/12/2008 Drilling Company: MATECO Driller's Name: Gary Swift, John Olson Drilling Method: Hollow Stem Auger Auger Size: 4.25" ID Rig Type: CME-55 Sampling Method: 2" x 2' Split Spoon	Northing: NA Easting: NA Casing Elevation: NA Borehole Depth: 24' bgs Surface Elevation: NA Descriptions By: Ron Kuhn	Well/Boring ID: MW-08 Proposed Client: Kalamazoo River Study Group Location: Plainwell, Michigan
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
										 <p>Locking J-Plug</p> <p>Steel Protective Casing</p> <p>Proposed bentonite grout 0 to 2' bgs</p> <p>Proposed 2" ID Type 304 Stainless Steel riser 2' ags to 5' bgs</p> <p>Proposed double casing 0 to 4' bgs</p> <p>Proposed bentonite seal 2 to 4' bgs</p> <p>Proposed grade #5 "Global Filter Pack" silica sand pack 4 to 15' bgs</p> <p>Proposed 2" ID Type 304 Stainless Steel 0.010" slotted screen 5 to 15' bgs</p>
		1	0-2	0.7	5 6 4 3	10	NA		Orange-brown fine to medium GRAVEL, some fine Sand and Silt, trace medium to coarse Sand, trace Clay, dense, damp (access road material).	
		2	2-4	0.3	2 2 2 2	4	NA		Dark gray Silty CLAY, trace Organics (Roots), damp.	
-5	-5	3	4-6	0.9	2 3 3	5	NA		Orange-brown fine SAND, trace medium to coarse Sand, trace fine Gravel, trace Silt, moist.	
		4	6-8	0.4	2 2 2 2	4	NA		Orange-brown Silty fine to coarse SAND, little fine to medium Gravel, loose, saturated.	
		5	8-10	0.9	1 1 4 6	5	NA		Gray-brown fine SAND, trace medium to coarse Sand, trace Silt, saturated. Gray Silty fine to medium GRAVEL.	
-10	-10	6	10-12	0.9	14 10 3 3	13	NA		Gray-brown fine to coarse SAND, little fine to medium Gravel, trace Silt, saturated. Gray-brown fine SAND, trace Silt, saturated.	
		7	12-14	1.0	1 4 5 7	9	NA		As above, grading to dark gray-brown fine to medium SAND, little coarse Sand, trace fine to medium Gravel, trace Silt, saturated, gradation change at ~12.5' bgs.	
		8	14-16	0.6	2 4 7 9	11	NA		Gray-brown fine to medium SAND, trace coarse Sand, trace fine to medium Gravel, trace Silt, saturated. Dark gray fine to medium GRAVEL, little fine to coarse Sand, trace Silt, loose, saturated.	
-15	-15									

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.



Well/Boring ID: MW-08 Proposed

Borehole Depth: 24' bgs

[illegible]

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.

Date Start/Finish: 11/17/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, Rob Merlington
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 2" x 2' Split Spoon

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 26' bgs
Surface Elevation: NA

Descriptions By: Ron Kuhn

Well/Boring ID: MW-09 Proposed
Client: Kalamazoo River Study Group

Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
										<p> Locking J-Plug Steel Protective Casing Proposed bentonite grout 0 to 8' bgs Proposed double casing 0 to 9' bgs Proposed 2" ID Type 304 Stainless Steel riser 2' ags to 11' bgs Proposed bentonite seal 8 to 10' bgs Proposed 2" ID Type 304 Stainless Steel 0.010" slotted screen 11 to 21' bgs Proposed grade #5 "Global Filter Pack" silica sand pack 10 to 21' bgs </p>
		1	0-2	0.6	2 2 2 3	4	NA		Brown Sandy Organic SILT, trace Organics (Roots, Wood), tree Root in tip of sample, damp.	
		2	2-4	1.0	2 2 2 2	4	NA		Dark orange-brown fine SAND, trace medium to coarse Sand, trace fine Gravel, trace Silt, damp.	
-5	-5	3	4-6	0.6	2 3 3 4	6	NA			
		4	6-8	1.2	6 6 11 18	17	NA		Gray-brown fine to medium SAND, little coarse Sand, little fine to medium Gravel, trace Silt, damp.	
		5	8-10	1.2	10 20 12 9	32	NA		As above, moist to wet at bottom of sample.	
-10	-10	6	10-12	1.3	5 3 3 5	6	NA		Orange-brown fine SAND, trace Silt, saturated.	
									Orange-brown fine to medium SAND, trace coarse Sand, trace fine to medium Gravel, trace Silt, saturated.	
		7	12-14	1.0	4 5 7 12	12	NA		Orange-brown fine to coarse SAND, little fine to medium Gravel, trace Silt, saturated.	
-15	-15	8	14-16	1.3	16 12 7 5	19	NA		Gray-brown fine to medium SAND, little coarse Sand, trace fine Gravel, trace Silt, saturated.	

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.




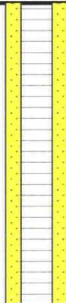
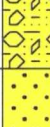
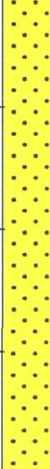
Client: Kalamazoo River Study Group

Well/Boring ID: MW-09 Proposed

Site Location:

Plainwell, Michigan

Borehole Depth: 26' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		9	16-18	0.7	13 12 7 7	19	NA		Gray-brown fine to medium SAND, little coarse Sand, trace fine Gravel, trace Silt, saturated.	
		10	18-20	1.7	6 6 3 3	9	NA		Gray-brown coarse SAND and fine GRAVEL, trace fine to medium Sand, saturated.	
-20	-20	11	20-22	1.7	2 3 6 7	9	NA		Gray-brown fine to medium SAND, little coarse Sand, trace fine to medium Gravel, loose, saturated.	
		12	22-24	1.7	4 4 4 7	8	NA			
		13	24-26	1.2	2 2 2 4	4	NA			
-25	-25									
-30	-30									
-35	-35									



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.

Date Start/Finish: 11/11/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, John Olson
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 2" x 2' Split Spoon

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 16' bgs
Surface Elevation: NA

Descriptions By: Ron Kuhn

Well/Boring ID: MW-10 Proposed
Client: Kalamazoo River Study Group

Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		1	0-2	1.3	2 3 4 4	7	NA		Dark brown Organic SILT, trace fine Sand, trace Organics, damp. Orange-brown fine to medium SAND, little coarse Sand, trace fine to medium Gravel, trace Silt, loose, damp.	
		2	2-4	1.0	1 1/12"	1	NA		Gray-brown grading to dark gray Silty CLAY, trace Organics (highly degraded), damp.	
-5	-5	3	4-6	1.0	2 1 1 1	2	NA		Dark gray-brown fine SAND, trace to little Silt, trace Shells, saturated.	
		4	6-8	1.1	NA	NA	NA		Light gray-brown Silty fine to medium GRAVEL, little fine to coarse Sand, loose, saturated. Light gray calcareous discoloration throughout.	
		5	8-10	0.4	7 5 13 8	18	NA		As above, poor recovery due to coarse Gravel in tip of shoe.	
-10	-10	6	10-12	0.8	7 4 4 7	8	NA		Light gray-brown fine to medium GRAVEL, little fine to coarse Sand, trace Silt, saturated. Light gray calcareous Silt throughout.	
		7	12-14	0.9	4 5 7 9	12	NA		Dark gray-brown fine to coarse SAND, little fine to medium Gravel, trace Silt, loose, saturated.	
-15	-15	8	14-16	0.7	3 4 4 6	8	NA			

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.



Date Start/Finish: 11/11/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, John Olson
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 2" x 2' Split Spoon

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 14' bgs
Surface Elevation: NA

Descriptions By: Ron Kuhn

Well/Boring ID: MW-11 Proposed
Client: Kalamazoo River Study Group

Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		1	0-2	1.3	2 3 5 9	8	NA		Dark brown Organic SILT, trace Organics, damp. Gray Silty CLAY, moist. Brown fine to medium SAND, trace Shells, loose, moist.	
		2	2-4	1.6	2 2 2 2	4	NA		Gray Silty CLAY, trace Organics, damp. Light brown fine SAND, trace Silt, moist. Dark gray Silty CLAY, trace highly degraded Organics, odor, moist.	
-5	-5	3	4-6	0.7	1 1 1	2	NA		Gray-brown fine to medium SAND, trace coarse Sand, trace Silt, trace Shells, saturated. As above, Little Silt.	
		4	6-8	0.5	1 1 1	2	NA			
		5	8-10	0.6	3 3 4 6	7	NA		Gray-brown fine to medium SAND, trace coarse Sand, trace fine to medium Gravel, trace light gray Silt in tip of sampler, trace Shells, loose, saturated.	
-10	-10	6	10-12	1.0	7 4 7 6	11	NA		Dark gray-brown fine to coarse SAND, little fine Gravel, loose, saturated.	
		7	12-14	0.7	3 3 3 3	6	NA		Gray-brown fine to coarse SAND, trace fine to medium Gravel, trace Silt, loose, saturated.	
-15	-15									



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Proposed well construction is shown for review.

Date Start/Finish: 11/10/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, John Olson
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 2" x 2' Split Spoon

Northing: NA
Easting: NA
Casing Elevation: NA
Borehole Depth: 14' bgs
Surface Elevation: NA
Descriptions By: Ron Kuhn

Well/Boring ID: MW-12 Proposed
Client: Kalamazoo River Study Group
Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
									Dark brown Organic SILT, trace fine Sand, damp.	
		1	0-2	1.65	3	6	NA		Light brown fine to medium SAND, trace Organics (Shells), trace Silt, loose, moist, at 2': Saturated.	
					5				Dark gray Silty CLAY, moderately soft, wet.	
					5				Gray-brown fine SAND, trace Silt, trace Shells, wet.	
		2	2-4	1.3	4	6	NA		Dark brown Silty fine SAND, trace highly degraded Organics, wet.	
					2				Gray-brown fine to medium SAND, trace coarse Sand, trace Silt, saturated, at 4': Trace Shells.	
					1				Dark gray Organic SILT, trace Clay, trace highly degraded natural Organics, slight odor, wet.	
-5	-5	3	4-6	0.9	1	2	NA		Dark gray Silty fine SAND, wet.	
					2				Dark brown Organic SILT, trace fine Sand, trace Shells, wet.	
					7				Gray fine to medium SAND, trace fine to medium Gravel, trace Silt, wet.	
		4	6-8	1.4	8	18	NA		Orange-brown Silty fine SAND, wet.	
					10				Gray-brown fine to medium GRAVEL, trace fine Sand, trace Silt, saturated.	
					12				Olive-brown Silty fine to coarse SAND, little fine to medium Gravel, loose, saturated.	
		5	8-10	1.0	6	16	NA		Olive-brown fine to coarse SAND, little fine to medium Gravel, trace Silt, loose, saturated.	
-10	-10				5					
					3					
		6	10-12	1.0	3	6	NA			
					3					
					3					
					3					
		7	12-14	0.8	3	6	NA			
					3					
					6					
-15	-15									

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.



Well/Boring ID: MW-13 Proposed
Client: Kalamazoo River Study Group
Location: Plainwell, Michigan



ARCADIS
Infrastructure, environment, facilities



Proposed well construction is shown for review.

Client: Kalamazoo River Study Group

Well/Boring ID: MW-13 Proposed

Site Location:
Plainwell, Michigan

Borehole Depth: 18' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		9	16-18	0.5	4 7 3 5	10	NA		Gray-brown fine to medium GRAVEL, little fine to coarse Sand, trace Silt, loose, saturated.	
-20	-20									
-25	-25									
-30	-30									
-35	-35									



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.

Date Start/Finish: 11/10/2008
Drilling Company: MATECO
Driller's Name: Gary Swift, John Olson
Drilling Method: Hollow Stem Auger
Auger Size: 4.25" ID
Rig Type: CME-55
Sampling Method: 2" x 2' Split Spoon

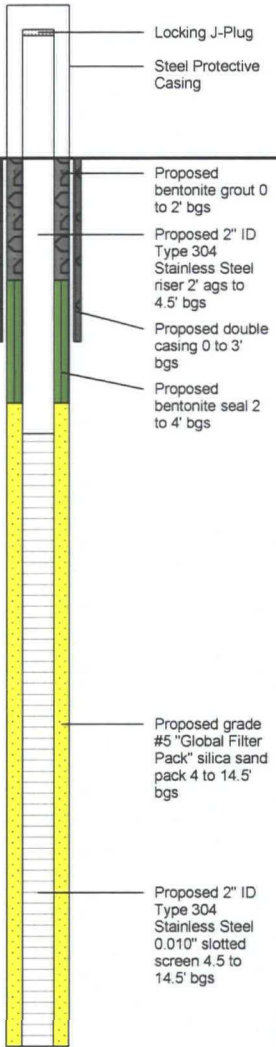
Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 16' bgs
Surface Elevation: NA

Descriptions By: Ron Kuhn

Well/Boring ID: MW-14 Proposed
Client: Kalamazoo River Study Group

Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
										
		1	0-2	1.7	2 2 2 2	4	NA		Dark brown SILT, trace fine Sand, trace Organics (Roots), damp. Brown fine to medium SAND, trace Silt, loose, damp. Light gray Clayey SILT, damp. Dark brown Organic SILT, trace Organics (Roots), damp.	Proposed bentonite grout 0 to 2' bgs Proposed 2" ID Type 304 Stainless Steel riser 2' ags to 4.5' bgs Proposed double casing 0 to 3' bgs Proposed bentonite seal 2 to 4' bgs
		2	2-4	1.3	1 1 1	2	NA		Dark brown Silty fine SAND, trace Organics (highly degraded), moist to wet. at 2' Wet. Gray-brown fine SAND, trace medium to coarse Sand, trace Silt, wet.	
-5	-5	3	4-6	1.6	1 1 2	2	NA		Brown SILT, trace fine Sand, wet. Light gray-brown fine SAND, little Silt, trace medium to coarse Sand, trace fine to medium Gravel, saturated. (Light gray SILT in Sand/Gravel matrix).	
		4	6-8	1.0	4 4 4 4	8	NA		Gray-brown fine to coarse SAND, trace fine to medium Gravel, trace Silt, saturated. As above, grading to dark gray at 8.7' bgs.	
-10	-10	5	8-10	1.0	NA	NA	NA			Proposed grade #5 "Global Filter Pack" silica sand pack 4 to 14.5' bgs
		6	10-12	0.9	2 3 3 4	6	NA		Dark gray fine to medium GRAVEL, little fine to coarse Sand, trace Silt, saturated.	
		7	12-14	1.0	2 3 3 4	6	NA			Proposed 2" ID Type 304 Stainless Steel 0.010" slotted screen 4.5 to 14.5' bgs
-15	-15	8	14-16	0.7	3 3 3 5	6	NA			

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.



Date Start/Finish: 11/11/2008
 Drilling Company: MATECO
 Driller's Name: Gary Swift, John Olson
 Drilling Method: Hollow Stem Auger
 Auger Size: 4.25" ID
 Rig Type: CME-55
 Sampling Method: 2" x 2' Split Spoon

Northing: NA
 Easting: NA
 Casing Elevation: NA
 Borehole Depth: 18' bgs
 Surface Elevation: NA
 Descriptions By: Ron Kuhn

Well/Boring ID: MW-15 Proposed
 Client: Kalamazoo River Study Group
 Location: Plainwell, Michigan

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		1	0-2	1.5	1 2 2 3	4	NA		Dark brown Organic SILT, trace moderately degraded Organics, damp. Gray-brown Clayey SILT, trace fine Sand, trace Organics, damp. Orange-brown fine SAND, trace Silt, damp.	
		2	2-4	0.9	2 2 2 3	4	NA		Orange fine SAND, trace Silt, trace medium Gravel, moist.	
-5	-5	3	4-6	0.5	1 2 3 3	5	NA		As above, Saturated.	
		4	6-8	0.8	3 3 4 4	7	NA		Gray-brown fine to medium SAND, little coarse Sand, trace fine to medium Gravel, trace Silt, loose, saturated.	
		5	8-10	0.8	3 5 4 4	9	NA		Gray-brown fine to coarse SAND, little fine to medium Gravel, trace Silt, saturated.	
-10	-10	6	10-12	1.2	3 4 4 7	8	NA		As above, grading to dark gray at 12.4' bgs.	
		7	12-14	0.6	3 6 4 4	10	NA			
-15	-15	8	14-16	0.4	2 3 3 4	6	NA		Dark gray fine GRAVEL, little fine to coarse Sand, saturated.	

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.



Client: Kalamazoo River Study Group

Well/Boring ID: **MW-15 Proposed**

Site Location:

Plainwell, Michigan

Borehole Depth: 18' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		9	16-18	0.0	3 3 3 4	6	NA		No recovery - slough.	
20	-20									
25	-25									
30	-30									
35	-35									



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Proposed well construction is shown for review.

